11/3/17

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696
TDD (503) 229-6993

October 1, 1999

Mr. J Leitz
Fred Devine Diving and Salvage, Inc.
6211 N. Ensign Street
Portland, Oregon 97217

CERTIFIED MAIL

Re: Fred Devine Diving and Salvage: Request for Performance of Remedial Investigation

Dear Mr. Leitz:

This letter informs you of the results of our review of information regarding hazardous substance contamination at the Fred Devine Diving and Salvage (Fred Devine) facility located at 12160 N.W. St. Helens Road in Portland, Oregon. The Oregon Department of Environmental Quality has determined that the Fred Devine site is a high priority for a remedial investigation and requests that ACF Industries, Inc. perform a remedial investigation in accordance with the Environmental Cleanup Law, Oregon Revised Statutes (ORS) 465.200 *et seq.*

The Fred Devine facility is located within or near a portion of the Willamette River known as the Portland Harbor. A 1997 investigation revealed significant contamination of sediments within the harbor. DEQ has undertaken review of available information regarding properties throughout the harbor to identify potential sources of the sediment contamination. The results of DEQ's review, based on available site data, historical operations, (including the use of hazardous substances), and the presence of contaminants in adjacent sediments, for the Fred Devine facility are summarized in the enclosed Strategy Recommendation.

Available information indicates that a release of a hazardous substance has occurred or might have occurred at the Fred Devine facility and come to be located in Willamette River sediments. DEQ has determined that remedial action might be necessary to protect public health, safety, welfare and the environment and that a remedial investigation must be performed. The remedial investigation will fully identify, among other things, the source, nature, and extent of any releases of hazardous substances to sediments at or near the Fred Devine facility, and determine whether further remedial measures will be necessary at the Fred Devine facility.

DEQ proposes that your performance of the remedial investigation be governed by an agreement in the form of the enclosed Voluntary Agreement for a Remedial Investigation and Scope of Work. The facility's remedial investigation will be coordinated with harbor-wide sediments investigations currently being pursued by DEQ. This will require commencement of the remedial investigation at the Fred Devine facility in the near future.

DEQ requests that you review the enclosed Strategy Recommendation and standard Voluntary Agreement and Scope of Work; and inform DEQ whether you are willing to perform a remedial investigation by signing and returning the enclosed Intent to Participate form within 30 calendar days of mailing of this letter. Upon receipt of the Intent to Participate, DEQ will forward you a Voluntary Agreement and Scope of Work specific to the Fred Devine facility, and request that any questions regarding the agreement be resolved so that the agreement may be entered no later than 60 calendar days from the mailing of this letter.

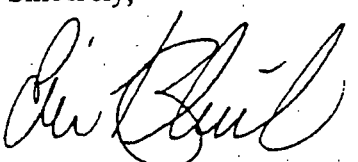
Please note that, by signature and return of the Intent to Participate form, you would indicate a willingness to enter a Voluntary Agreement under the terms of the enclosed standard Voluntary Agreement. The second Voluntary Agreement that DEQ will forward you after receipt of the Intent to Participate will include the Fred Devine facility's name and other information specific to the facility. However, DEQ does not intend to substantially negotiate or revise the terms of the standard Agreement. The 60 days provided for entry of the Voluntary Agreement therefore should be sufficient.

Should you not indicate a willingness to perform the remedial investigation by return of the Intent to Participate form, or should you subsequently refuse to enter a Voluntary Agreement for the remedial investigation, DEQ will assume you are not willing to perform the remedial investigation. In this case, as with other facilities in the Portland Harbor, DEQ will exercise all remedies available to it under the Environmental Cleanup Law to ensure that necessary investigations are undertaken. These remedies include but are not limited to issuance of a unilateral administrative order requiring performance of the remedial investigation, and performance of the investigation by DEQ itself with subsequent cost recovery from liable parties.

Finally, please be advised that DEQ is required by ORS 465.330 to recover remedial action costs incurred by DEQ, including for site assessment activities. You will be receiving an invoice in the near future for DEQ's costs of preparing the Strategy Recommendation for the Fred Devine facility. Reimbursement of future DEQ costs will be provided through the voluntary agreement for the facility, if one is entered.

You may reach me at (503) 229-5648 if you have any questions related to the enclosed Strategy Recommendation.

Sincerely,



Eric Blischke,
Coordinator
Portland Harbor Study Area
Waste Management and Cleanup Division

Enclosures

c: Kurt Burkholder, DOJ
Dave St. Louis, Manager, NWR Site Assessment Program
Mike Rosen, NWR Voluntary Cleanup Program
Gil Wistar, Coordinator, Site Assessment Program
ESCI File No.: 794

VOLUNTARY CLEANUP PROGRAM
INTENT TO PARTICIPATE

Identification of Site

Site Name: Fred Devine Diving and Salvage

Site Address: 12160 NW St. Helens Road, Portland, OR

Owner/Operator: Fred Devine Diving and Salvage, Inc.

Mailing Address: Attn: Mr. J. Leitz, Fred Devine Diving and Salvage, Inc.
6211 N. Ensign Street, Portland, OR 97217

Intent to Participate

The undersigned intends to negotiate in good faith a written agreement with DEQ to provide for voluntary performance of a remedial investigation under DEQ oversight. The agreement will describe the project activities of each party and will require the undersigned to reimburse DEQ for oversight costs.

With this Intent to Participate, the undersigned does not admit or assume liability regarding the site.

Please execute this Intent to Participate in the space below and return it to:

Eric Blischke
Department of Environmental Quality
Waste Management and Cleanup Division
811 S.W. Sixth Avenue
Portland, OR 97204

By: _____ Name: _____
(signature of authorized representative) (print or type)

Title: _____ Company: _____

Date: _____ Telephone: _____

OREGON DEPARTMENT of ENVIRONMENTAL QUALITY
SITE ASSESSMENT ACTION - Northwest REGION

Facility Name: Fred Devine Diving & Salvage Inc. ECSI #: 2365

Address: 6211 N. Ensign St.
Portland, OR 97217

PRP:
Company: Fred Devine Diving & Salvage, Inc.
Name: J. Leitz Phone: 503-283-5285
Address: 6211 N. Ensign St.
Portland, OR 97217

Action Date: 8/31/99

Report Type: Strategy Recommendation

Preliminary Assessment:

____ State ____ Federal ____ Voluntary ____ PAE ____ XPA

Screening:

__X__ State ____ Federal ____ Spill

Note: Spill screenings may not require Strategy Recommendation

Recommended Action:

____ NFA [Need management approval]

____ Add to CRL

____ Add to Inventory

____ High Priority--Requires immediate response

__X__ Other
Describe: High priority RI

Report Writer: Tom Gainer

	Headquarters	EPA	Other
Transmittal Date(s):			
Report Supplement(s):			

	Sample Analysis	Photos	Operating Plans	Other
Supplemental Date(s):				

Checklist:

__X__ Strategy Recommendation
__X__ Data (if applicable)
____ Site Report
____ Letter to RP
____ Spill Report (if applicable)
__X__ SAPS
__X__ Map

Manager's approval: _____

SITE ASSESSMENT PRIORITIZATION SYSTEM (SAPS) - SCORESHEET

Site Name: Fred Devine Diving & Salvage, Inc.

Site Address: 6211 N. Ensign St.
Portland, OR 97217

ECSI Number: 2365

EPA ID Number:

Site Evaluator: Tom Gainer

Date: 8/31/99

		HIGH THREAT	MEDIUM THREAT	LOW THREAT	NO THREAT	CONF. VALUE
1.	Potential to Release (Route Characteristics)					
	a. Haz. Sub. Containment	9	(6)	3	0	B
	b. Depth To Aquifer	(6)	4	2	0	A
	c. Distance to DW Well	6	4	(2)	0	A
	d. Soil Permeability	(3)	2	1	0	B
	e. Distance to Surface Water	(6)	4	2	0	A
2.	Haz. Sub. Characteristics					
	a. Source Quantity	(9)	6	3	0	B
	b. Toxicity/Persistence	(9)	6	3	0	B
	c. Water Solubility	3	(2)	1	0	B
3.	Exposure Potential					
	a. Groundwater Use	9	6	(3)	0	B
	b. Land Use/Population	6	(4)	2	0	A
	c. Surface Water Use	9	(6)	3	0	A
	d. Sensitive Environments	(6)	4	2	0	A
	e. Direct Contact	6	(4)	2	0	B
4.	Evaluator Assessment of Threat	(13)	9	5	0	A

- Add the circled numbers to get the total SAPS score -

Confirmed Release ___ Y X N

Total SAPS Score = 79 (out of 100 possible points)
Priority Associated with Score = H (H, M, L)

DISCUSSION:

Discuss your overall impression of the threat posed by the site. Include brief discussion of major factors such as potential or known releases, waste quantity, human and environmental targets, and use of nearby groundwater or surface water. Also discuss any important factors or considerations not addressed in the SAPS scoresheet. Discuss whether you feel the SAPS score generated for the site reflects the overall threat posed by the site to the surrounding population and environment.

The following contaminants were elevated above Portland Harbor baseline concentrations in sediment samples collected adjacent to the subject site: arsenic, cadmium, copper, zinc, bis(2-Ethylhexyl)phthalate, butylbenzylphthalate, di-n-butylphthalate, and low- and high-molecular weight polycyclic aromatic hydrocarbons (LPAHs and HPAHs, respectively). The subject site may have contributed towards sediment contamination near the city stormwater outfall and appears to be the primary source of highly elevated PAH contamination adjacent to the facility's dock.

RECOMMENDATION:

- [x] Further Action - High Priority
- [ ] Further Action - Medium Priority
- [ ] Further Action - Low Priority
- [ ] No Further Action
- [ ] Refer To _____ for further consideration
- [ ] Other: _____

LISTING RECOMMENDATION

- [ ] Recommend proposal on Confirmed Release List
- [ ] Recommend proposal on Inventory
- [x] Insufficient information to list on the Confirmed Release List
- [x] Insufficient information to list on the Inventory
- [ ] Excluded from listing

DEQ SITE ASSESSMENT PROGRAM - STRATEGY RECOMMENDATION

Site Name: Fred Devine Diving & Salvage, Inc.

Site CERCLIS Number: (none)

DEQ ECSI Number: 2365

Site Address: 6211 N. Ensign Street
Portland, Oregon 97217

Recommendation By: Tom Gainer, Voluntary Cleanup and Site Assessment Section, DEQ Northwest Region

Approved By: Michael E. Rosen, Portland Harbor Manager, DEQ Northwest Region

Date: September 21, 1999

NOTE: This site (Figures 1 and 2) is within a 6-mile stretch of the Lower Willamette River in which the U.S. Environmental Protection Agency (EPA) conducted a sediment study in 1997. This area, referred to as the *Portland Harbor*, is between the upstream ends of Sauvie Island (River Mile 3.5) and Swan Island (RM 9.5). The purpose of this Strategy Recommendation is to determine whether a specific hazardous substance release or a specific past operation at the site can be linked to contamination documented by EPA in sediments adjacent to the site. Because of this focus, the Strategy Recommendation may omit some historical site information, regulatory issues, or further-action conclusions that might otherwise be included in a DEQ Strategy Recommendation.

Background, Portland Harbor Sediment Evaluation

In September and October 1997, EPA's contractor, Roy F. Weston, Inc., collected 187 near-shore sediment samples within the Portland Harbor area defined above. Most samples (150) were collected as shallow grab samples within the upper 6 to 17 centimeters (cm) of sediments. 37 deeper composite core samples, from depths of between 55 and 139 cm, were also collected. All samples were analyzed for total metals, semi-volatile organic compounds (SVOCs), total organic carbon (TOC), and sediment grain size. Selected samples were also variously analyzed for organotins (TBTs), pesticides,

polychlorinated biphenyls (PCBs), chlorinated herbicides, and polychlorinated dioxins and dibenzofurans.

Based on analytical results from this study, which showed extensive sediment contamination, EPA is currently considering Portland Harbor for inclusion on the federal National Priority List (NPL - also known as Superfund).

Between late 1998 and mid-1999, DEQ examined EPA's analytical data to determine potential sources for sediment contamination in the Harbor. Potential sources associated with the most contaminated areas of sediment were sites already active in DEQ's Cleanup Programs.

DEQ categorized other areas of sediment contamination (i.e., those areas not thought to be associated with active Cleanup Program sites) by defining the areas:

- having the highest detected concentration of a given contaminant;
- with contaminant concentrations in the upper five percent of a given contaminant's detected concentrations; and
- having contaminant concentrations above an apparent "baseline range" most commonly detected throughout the harbor area.

DEQ categorized in this manner because there are no established freshwater sediment contaminant concentration guidelines or well-defined background contaminant concentrations for the harbor area. The contaminant "baseline range" was developed by examining the geometric distribution of concentrations for each contaminant detected. Any sediment concentrations that appeared to depart significantly from the ranges most commonly detected were suspected of lying near a potential contaminant source.

A shallow and subsurface sediment sample (SD136 and SD136-C, respectively) were collected adjacent to the southeastern boundary of the Devine facility, which is also in the vicinity of the City of Portland Ensign Street stormwater outfall (Figure 3). As shown on Table 1, the shallow sample, SD136, had concentrations of cadmium, copper, zinc, bis(2-ethylhexyl)phthalate, and butylbenzylphthalate that exceeded baseline levels. The subsurface sample, SD136-C, had concentrations of cadmium and di-n-butylphthalate that exceeded baseline levels.

It appears that the Devine site could have contributed towards the metal and phthalate contamination detected at sample location SD136 based on their site activities. Since the stormwater drainage

pipeline is shared with other properties in the area that could contribute contaminants to stormwater drainage or directly to the river, Devine's potential contribution to sediment contamination observed at SD136 is unclear.

The Port of Portland and Cascade General, Inc. conducted a sediment investigation of the Portland Shipyard and issued a report in November 1998 that contained additional sediment data. One of their sampling locations, PSY12, was on the north side of the Devine dock (Figure 3). As shown on Table 1, shallow sample PSY12 had concentrations of arsenic, copper, zinc, bis(2-ethylhexyl)phthalate, and low- and high-molecular weight polynuclear aromatic hydrocarbons (LPAHs and HPAHs, respectively) that exceeded baseline levels. Their sample at the Devine dock was identified as one of the highest "hot spots" for PAHs in the Portland Shipyard. As shown on Figures 4 and 5, the Devine dock appears to be the source of PAH contamination.

One shallow sediment sample (SD129) was collected about 1,000 feet northwest of the Devine facility, adjacent to the U.S. Coast Guard dock. Contaminant concentrations in sample SD129 that exceeded Portland Harbor baseline concentrations include: barium, cadmium, copper, iron, lead, mercury, zinc, 4-methylphenol, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, di-n-butylphthalate, and HPAHs. However, of these contaminants, only concentrations of copper, zinc, 4-methylphenol, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, and di-n-butylphthalate are significantly elevated above Portland Harbor baseline concentrations (by greater than 10%). Although there are many similar contaminants downstream at SD129 as in SD136, there is no clear link between the Devine facility and downstream sediment contamination.

Operational History

The following site history was summarized primarily from a Phase I Environmental Assessment (July 17, 1992) and Update (December 4, 1995) prepared for Devine. Fred Devine Diving & Salvage started operations in 1975 and was the first occupant of the 5.7-acre site. A detailed description of Devine's on-site activities was not available for this Strategy Recommendation.

Pacific Coast Environmental, Inc. operated an industrial cleaning and hazardous waste transportation business as a tenant on the subject property from about 1988 to 1995. They used two above ground tanks for diesel fuel and stored tanks, drums, and wastewater from tank cleaning operations prior to off-site disposal. A floor drain in their portion of the warehouse was connected to an oil-water separator and discharged to "the sewer system." It is not clear whether the above ground tanks are still on site and in use.

Portland Steam Navigation Co. leased office and dock space starting around 1987 and operated the river excursion boat "Portland Rose" from the site.

Aerial photographs show the property was undeveloped in 1963 and was a wetland in 1936.

Regulatory History

Spills

On March 10, 1999, a 1000 by 400-foot petroleum sheen was observed in the river originating at the storm sewer outfall at the base of Ensign Street adjacent to the Devine site (OERS #99-696). The storm sewer drains multiple properties, including the Devine property, and a spill source was not determined.

A 500 by 35-foot petroleum sheen was observed at the same outfall location on June 24, 1980, and a spill source was not determined.

Underground Storage Tanks

Two 2,000-gallon and one 4,000-gallon gasoline underground storage tanks (USTs) were removed from the subject site in April 1993. DEQ records indicate that the three tanks had not leaked and that the tank closures were clean.

Hazardous Waste

Pacific Coast Environmental operated as a hazardous waste generator (ORR000000612) until 1995. A complaint was received by the DEQ in March 1995 concerning possible dumping of hazardous materials (just prior to the company going out of business). A subsequent DEQ site visit found no violations but noted "suspicious disposal procedures."

Water Quality

The facility does not have a water/stormwater discharge permit.

Site Hydrogeology

The site lies in the northern-most Portland Basin, a major north-southeast trending sediment filled structural depression found in the northern part of the Willamette River valley and adjoining Columbia River valley (Swanson et al, 1993). The basin is filled with recent alluvium, Pleistocene cataclysmic flood deposits, Miocene to Holocene nonmarine sedimentary rocks, and is underlain by Eocene to Miocene volcanic and sedimentary rocks that are exposed along the basin margins.

The youngest deposits are recent alluvium (silt, sand and gravel mixtures) characteristic of an active fluvial environment. These are made up of shoreline, river channel, and adjacent floodplain deposits.

Terraces that rise 50 to 100 feet above the northeastern shore of the Willamette were formed during Pleistocene cataclysmic flooding related to glacial Lake Missoula, and consist of unconsolidated mixtures of silt, sand, and gravel that generally are coarser than the recent deposits. Fill comprised of fine to medium sands and silt was also placed in many areas along the river during site development. The total thickness of recent alluvium and flood deposits appears to be about 100 feet in the vicinity of the site.

Coarse gravel to conglomerate of the Troutdale Formation, deposited by the ancestral Columbia River, underlies the cataclysmic flood deposits and appears to be about 100 feet thick in the vicinity of the site. Sandy River mudstone underlies the Troutdale Formation and appears to be about 100 feet thick. Basalt of the Columbia River Basalt (CRB) group forms the basement rock of the Portland Basin, and may be as much as several hundred feet thick in the vicinity of the site.

Aquifers in the unconsolidated sedimentary deposits generally are unconfined and localized due to heterogeneity of the deposits. The Troutdale Formation is an important regional aquifer and is widely tapped for both potable and non-potable uses. Interbedded Claystone and/or siltstone, or cementation often promotes confined aquifer conditions within the Troutdale Formation. Deep wells installed in fractured CRB can be very productive and important supply wells. Site elevation is about 30 feet above mean sea level.

Pathway Summary

The Devine facility lies in an area of mixed industrial and commercial use. There are no residences within 1/4 mile of the facility.

Utility trench workers could potentially be exposed to any potential subsurface contaminants through direct contact, inhalation, or incidental ingestion.

Oregon Water Resources Department has no well logs for domestic wells within one mile of the subject site.

The nearest significant wetland is located approximately five miles downstream at the mouth of Multnomah Channel. Cathedral Park is located approximately two miles downstream of the subject site.

Both recreational and subsistence fishing occur within the Lower Willamette River. Commercial fishing within the Portland Harbor is limited to a small Pacific lamprey fishery. Recreational boating, water skiing, swimming, and beach use also occur within the Harbor.

The Lower Willamette River provides habitat for 39 fish species, including populations of wild cutthroat trout, rainbow trout, and mountain whitefish. White sturgeon are plentiful within the Harbor. The Harbor is also an important migratory corridor, nursery habitat, and adult foraging area for two runs of chinook salmon, two runs of steelhead trout, and individual runs of coho and sockeye salmon.

Upper Willamette River populations of chinook and steelhead, which migrate through the Harbor, are listed as threatened species under the Federal Endangered Species Act. The Pacific lamprey is considered a federal species of concern.

Great blue herons, cormorants, osprey, mergansers, kingfishers, peregrine falcons, and bald eagles routinely forage within the Harbor. The area is also part of the wintering range for the Aleutian Canada goose. All are protected under the Migratory Bird Treaty Act. The peregrine falcon is federally listed as an endangered species, while the Aleutian Canada goose is federally listed as threatened species. The bald eagle also is a threatened species, but was recently proposed to be removed from this list.

There is little data on the nature and extent of the benthic community within Portland Harbor sediments. However, it is known that contamination in the benthos, which is a protected beneficial use, can be the source of food-chain effects that radiate up to the species listed above, including humans.

The Lower Willamette River is water quality limited for the following toxic compounds:

- Dioxins/furans (water column and sediments);
- Mercury (fish tissue);
- Pesticides (water column and sediments);
- Polynuclear Aromatic Hydrocarbons - PAHs - (water column and sediments); and
- Trace metals (water column and sediments).

DEQ's Water Quality Division is developing Total Maximum Daily Load requirements (TMDLs) within the lower Willamette River for these contaminants. A TMDL for 2,3,7,8-TCDD was established in 1991.

Conclusions/Recommendations

NOTE: As indicated previously, this review is limited to establishing a link between site activities and contamination in adjacent Portland Harbor sediments. It does not necessarily represent a thorough review of available site data, and the conclusions and recommendations presented below may reflect this limited focus.

The following conclusions are based on the contents of this review:

- Site activities may have contributed towards sediment contamination adjacent to the site. Moderately elevated concentrations of sediment contaminants adjacent to the site near the city stormwater outfall (cadmium, copper, zinc, bis(2-ethylhexyl)phthalate, and butylbenzylphthalate, and di-n-butylphthalate) are potentially consistent with current and historical site activities. The source of contaminants is not clear because the sediment sample was collected in the vicinity of a city stormwater outfall that collects stormwater from multiple properties, including the subject property.

- The current and historical use of the site's dock, possibly for conveyance of materials and boat fueling and maintenance, appears to be a source of sediment contamination by routine or accidental activities. A sediment sample collected adjacent to the site dock showed elevated levels of arsenic, copper, zinc, and PAHs. The PAH sediment concentrations were particularly high, showing as a hot spot within the Portland Shipyard with the Devine dock appearing as the contaminant source.

- Additional possible migration pathways resulting in sediment contamination from the site include stormwater runoff directly to the river or into the city stormwater sewer.

Contamination of river sediments in the vicinity of the Devine site may represent a threat to human health and aquatic life within the river. The specific nature and significance of these threats cannot be determined without further characterization and delineation of contamination in groundwater, subsurface soil, and sediments. A Remedial Investigation (RI) is required to evaluate the potential ecological threat of the sediment contamination. It is recommended that once the full character and extent of site sediment contamination has been determined, a Risk Assessment, including sediment bioassays and bioaccumulation assessment, be conducted. EQ has determined that these actions warrant a high priority for follow-up.

ere is insufficient information to propose adding the site to Q's Confirmed Release List or Inventory.

eferences

EQ consulted the following general references in preparing this trategy Recommendation:

1. Portland Harbor Sediment Investigation Report, prepared by Roy F. Weston, Inc. for USEPA, May 1998.

2. Phase I Environmental Assessment, prepared by Marine & Environmental Testing, Inc. for Fred Devine Diving & Salvage, Inc., July 17, 1992.

3. Phase I Environmental Assessment Update, prepared by Marine & Environmental Testing, Inc. for Fred Devine Diving & Salvage, Inc., December 4, 1995.

4. Portland Shipyard Sediment Investigation, prepared by Striplin Environmental Associates, Inc. for Port of Portland and Cascade General, Inc., November 9, 1998.

5. DEQ LUST Database.

6. DEQ HWIMSy Hazardous Waste Generator Database.

7. DEQ SPINS Spill Database.

8. MetroScan Property Records, Multnomah County, Oregon.

Attachments

Table 1: River Sediment Contaminant Concentrations

Figure 1: Site Location Map

Figure 2: Site Property Boundary Map

Figure 3: Sediment Sampling Points, 1997 Portland Harbor Sediment Investigation

Figure 4: Contours of 0-4 ft Surface Total LPAH Concentrations in the Vicinity of the Portland Shipyard

Figure 5: Contours of 0-4 ft Surface Total HPAH Concentrations in the Vicinity of the Portland Shipyard

TABLE 1

River Sediment Contaminant Concentrations (1997)
Fred Devine Diving and Salvage Co.

Contaminant	Units	Northwest SD129	*Fred Devine Diving and Salvage* PSY12	SD136	SD136-C	Apparent Portland Harbor Sediment Baseline Maximum Value
Aluminum	ppm	38600	NA	15400	29200	42800
Antimony	ppm	<6	0.6	<7	<4	<5
Arsenic	ppm	<6	17	<7	<4	<5
Barium	ppm	197	NA	138	168	195
Beryllium	ppm	0.7	NA	0.3	0.5	0.7
Cadmium	ppm	0.7	0.4	1	0.8	0.6
Chromium	ppm	41	17	25	40	41
Cobalt	ppm	18	NA	13	15	19.7
Copper	ppm	131	119	82	43	60
Iron	ppm	47300	NA	37900	35400	45000
Lead	ppm	38	27	24	27	30
Manganese	ppm	698	NA	323	431	810
Mercury	ppm	0.16	<0.05	0.06	0.04	0.1
Nickel	ppm	29	18	20	25	32
Selenium	ppm	15	NA	10	9	15
Silver	ppm	1.4	0.2	0.9	0.9	1.4
Thallium	ppm	11	NA	<7	4	13
Titanium	ppm	NA	NA	NA	NA	2075
Vanadium	ppm	108	NA	69	90	112
Zinc	ppm	279	264	178	116	118
2-Methylnaphthalene	ppb	26	20	<19	<19	150
4-Methylphenol	ppb	1100	NA	380	<19	680
Benzoic Acid	ppb	<190	NA	<190	<190	<200
Benzyl Alcohol	ppb	<19	NA	<19	<19	<20
bis(2-Ethylhexyl)phthalate	ppb	760	440	2100	370	390
Butylbenzylphthalate	ppb	74	<10	62	<19	<20
Carbazole	ppb	25	NA	<19	<19	100
Di-N-Butylphthalate	ppb	51	<10	<19	44	<20
Di-N-Octylphthalate	ppb	<19	13	<19	<19	<20
Dibenzofuran	ppb	20	26	<19	<19	100
Dimethylphthalate	ppb	<19	<10	19	<19	<20
Pentachlorophenol	ppb	<96	<100	<96	<97	Detect
Phenol	ppb	<19	<50	<19	<19	<20
LPAHs (total)	ppb	433	2433	129	61	700
HPAHs (total)	ppb	2474	17268	1025	577	2400
DDTs (total)	ppb	NA	<6	NA	NA	220
PCBs (total)	ppb	NA	57	NA	NA	<180
Organotins (total)	ppb	NA	NA	NA	NA	300
2,4-D	ppb	NA	NA	NA	NA	<3.3
2,4-DB	ppb	NA	NA	NA	NA	<5
TOC	%	1.8	1	1.5	1.3	2
Water Depth	ft	31		20	20	
Sediment Sample Depth	cm	0-10	0-10	0-10	0-90	

NA = not analyzed

PSY sample data from Portland Shipyard (November 9, 1998)

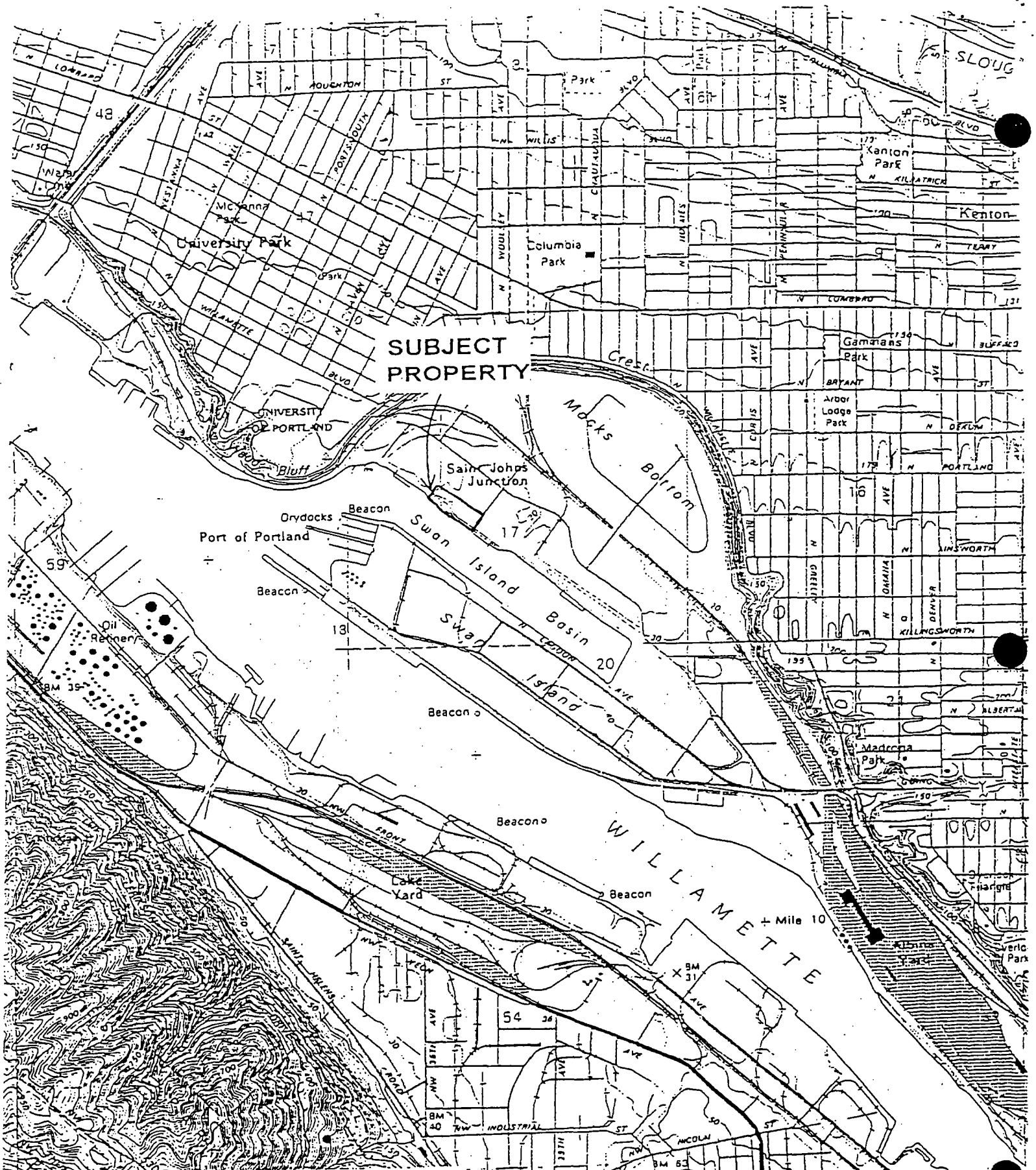


Figure 1: Site Location Map

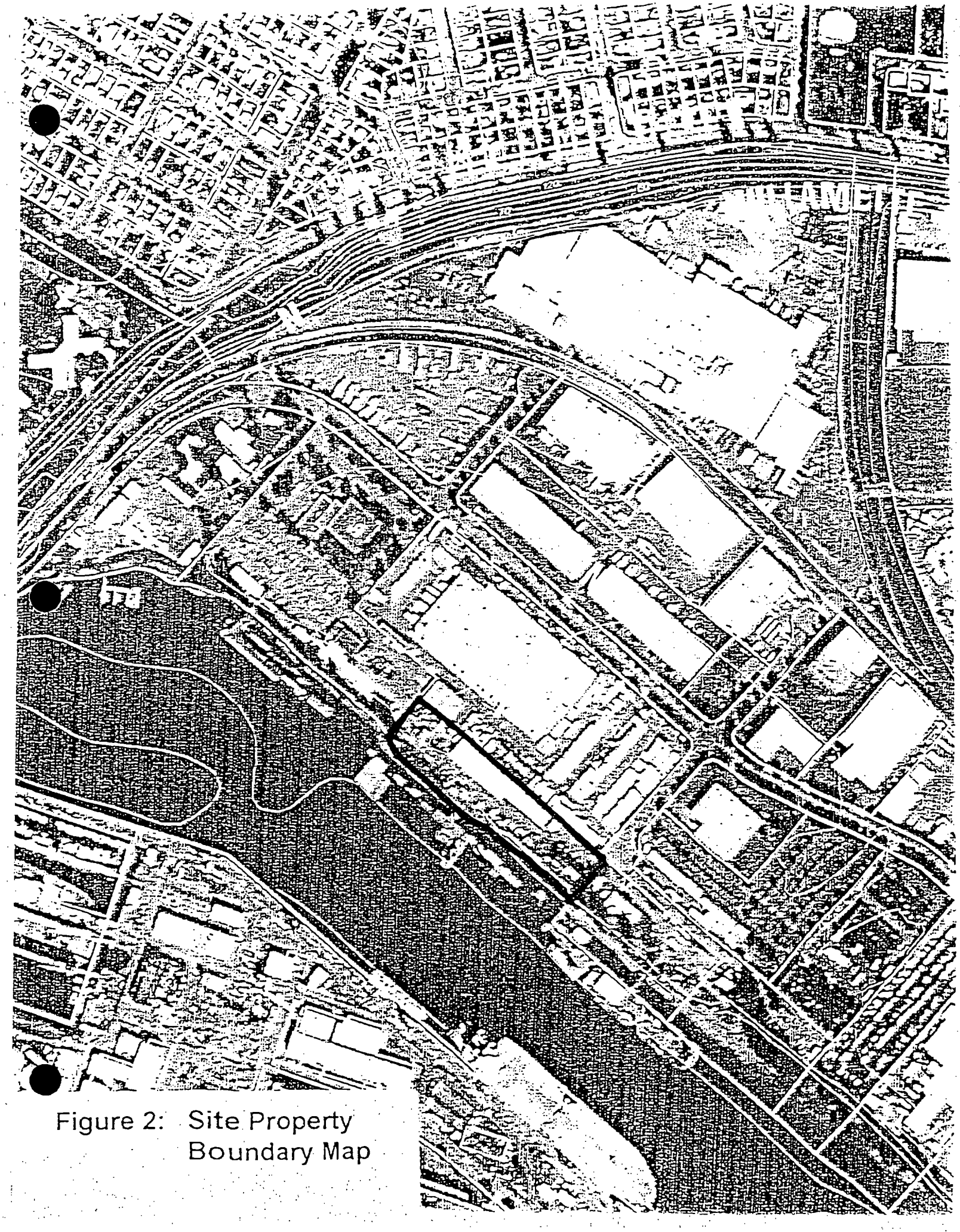


Figure 2: Site Property Boundary Map

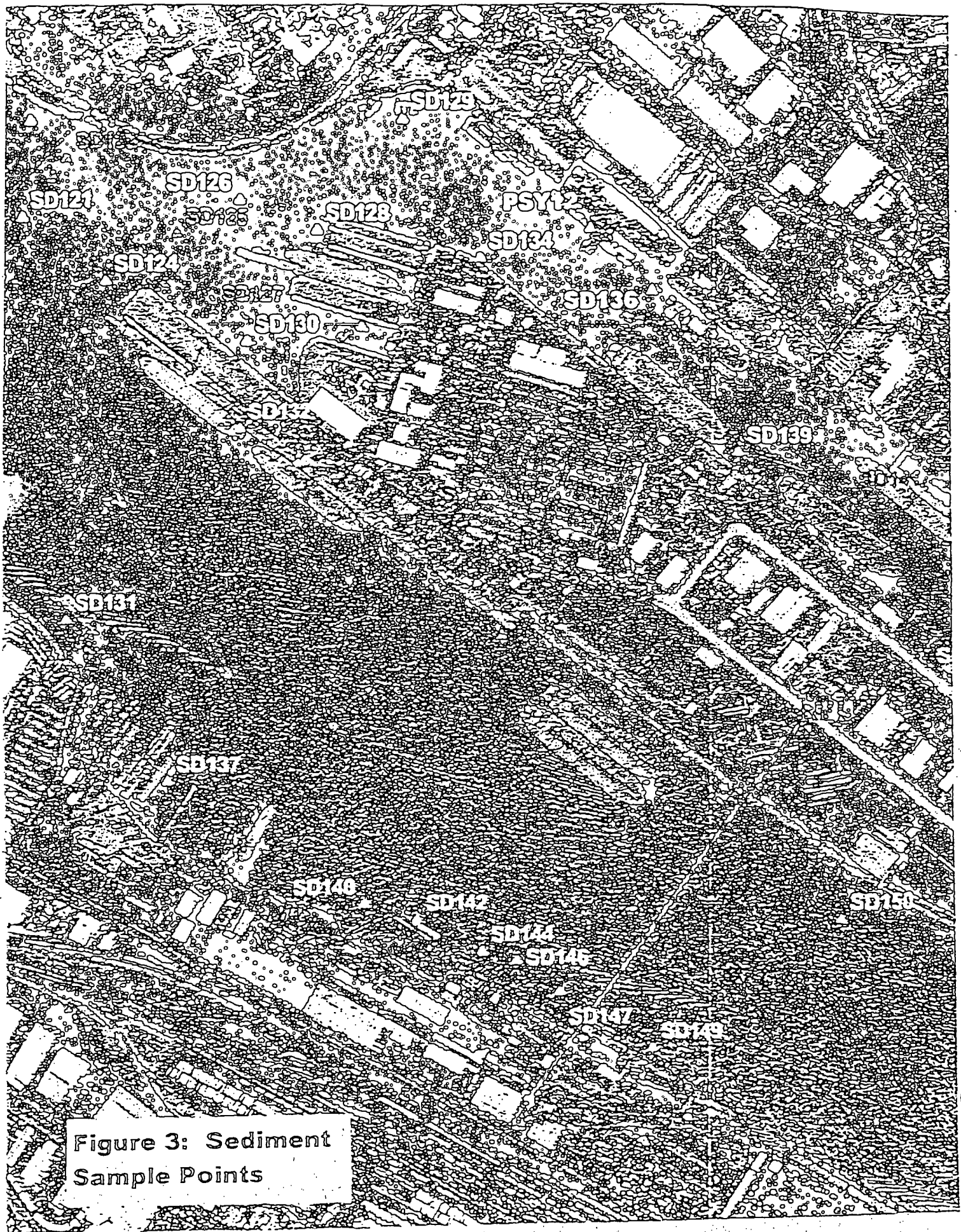


Figure 3: Sediment Sample Points

Figure 4

Contours of Surface Total LPAH Concentrations in the Vicinity of the Portland Shipyard

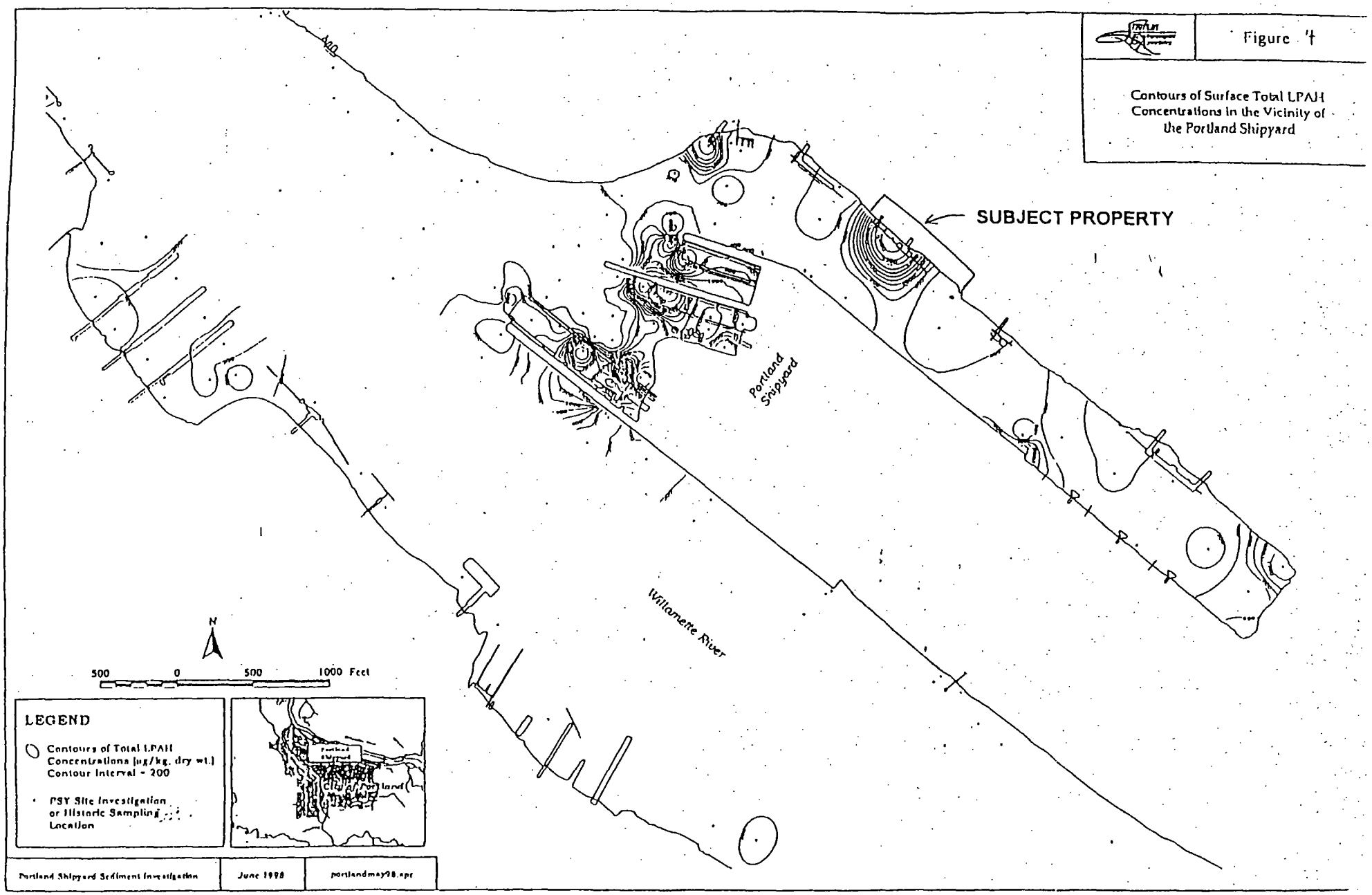
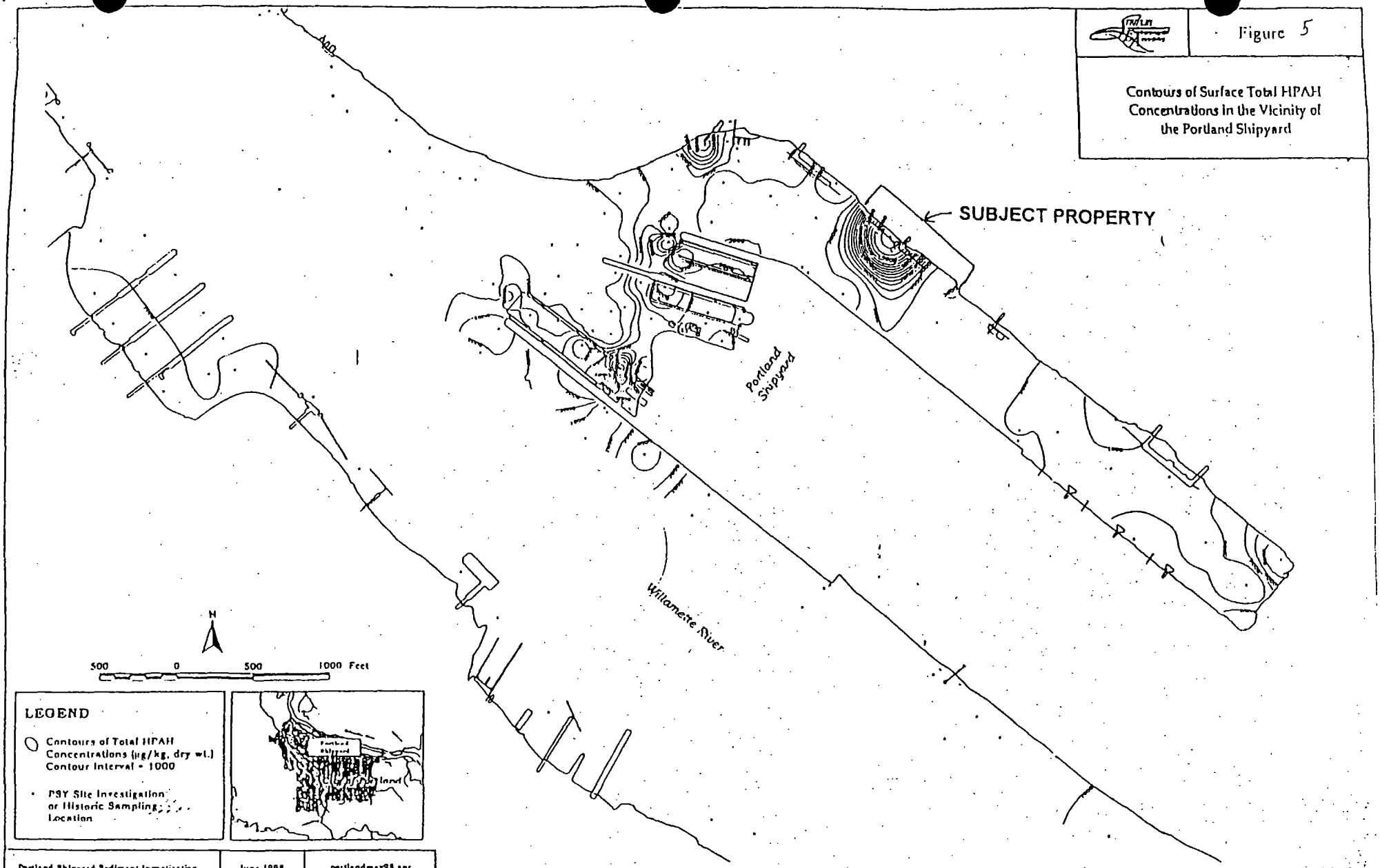


Figure 5

Contours of Surface Total HPAH Concentrations in the Vicinity of the Portland Shipyard



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